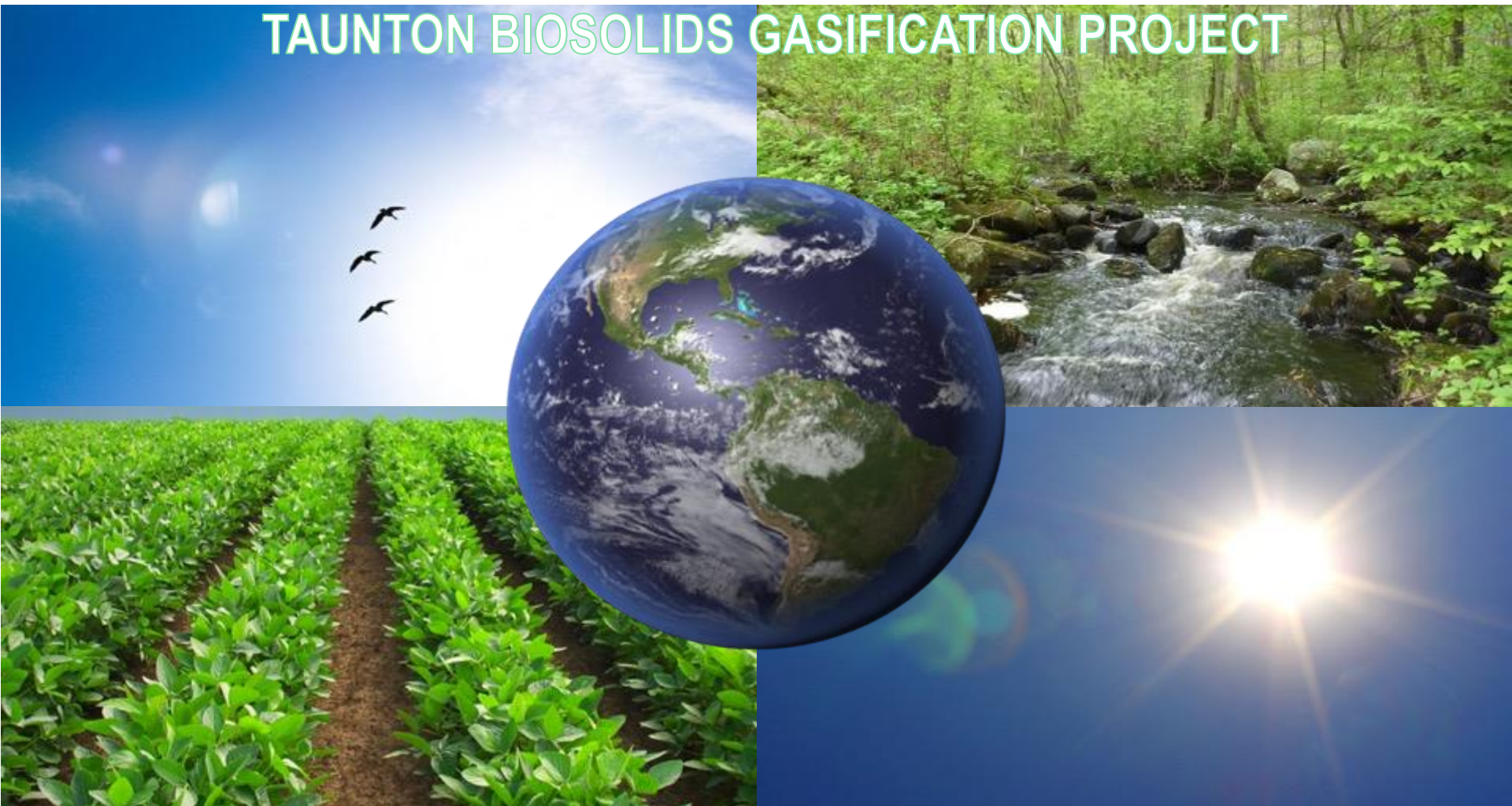




# ARIES CLEAN ENERGY

## TAUNTON BIOSOLIDS GASIFICATION PROJECT



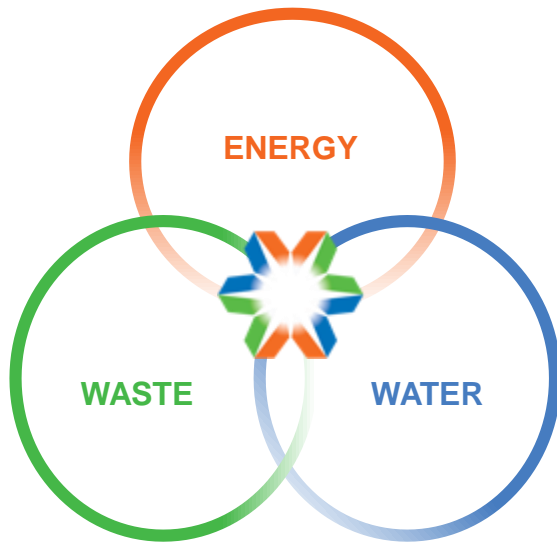
**Presentation to Taunton City Council  
December 29, 2020**



# Executive Summary – Aries Biosolids Gasification Technology

## Aries Clean Energy

Based in Nashville, Tennessee, **Aries Clean Energy, LLC** is a patent holder, manufacturer and system integrator that develops projects using its **proven, proprietary downdraft and fluidized bed gasification systems for municipal and industrial customers**. Since 2010, Aries has been gasifying materials such as biosolids that would otherwise be landfilled while producing renewable and sustainable energy.



- Closed loop energy neutral system
- 95% volumetric reduction of biosolids
- Sustainable long-term solution
- Reduces land application and incineration
- No odors from facility
- PFAS solution



- Sustainable zero landfill solution
- Carbon neutral to negative
- Reduces biosolids hauling, reduces CO2 emissions
- Gasifier air emissions expected to be lower than existing SSI's in MA



- System produces clean, renewable heat energy from synthesis gas
- System produces a valuable biochar product that replaces coal fly ash in concrete applications

- Facility will be owned/operated by Aries
- Aries has 10+ years of technology development and operating history
- Full-scale commercial facility constructed and operating
- Fluidized bed gasifier -18 months of commercial operation
- Feedstock includes wood waste, biosolids, and agricultural waste
- Small/medium capital requirement that can be project financed
- Robust near-term project pipeline
- Experienced team with an average of 30 years in clean technology and energy



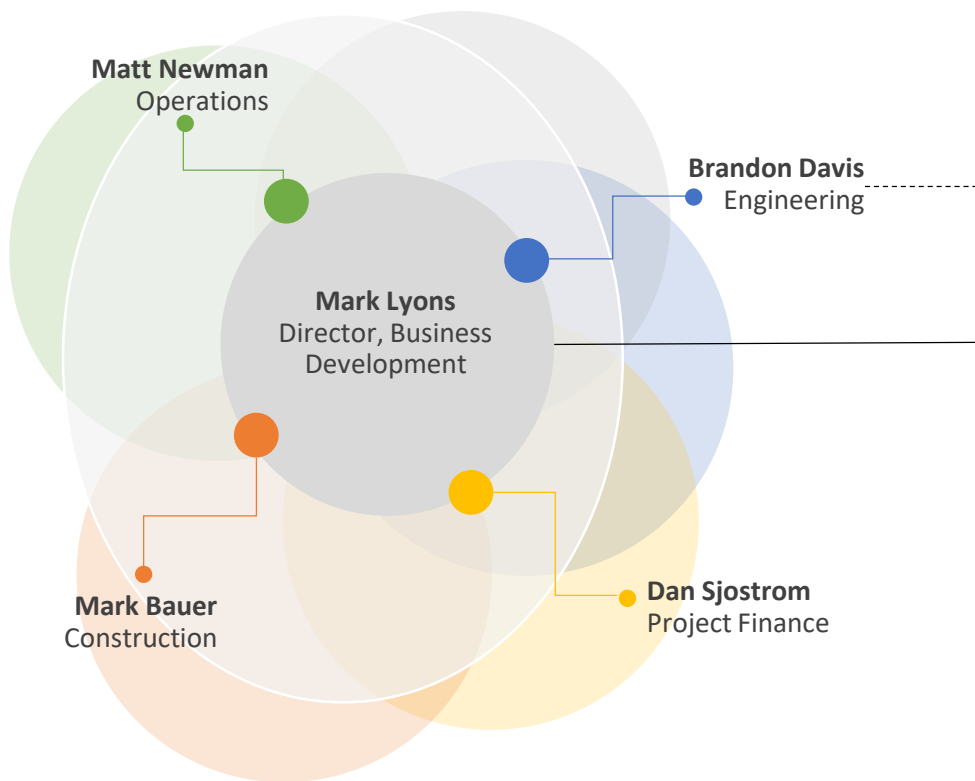
Lebanon, TN



Sanford, FL

# Aries Project Development Team - Massachusetts

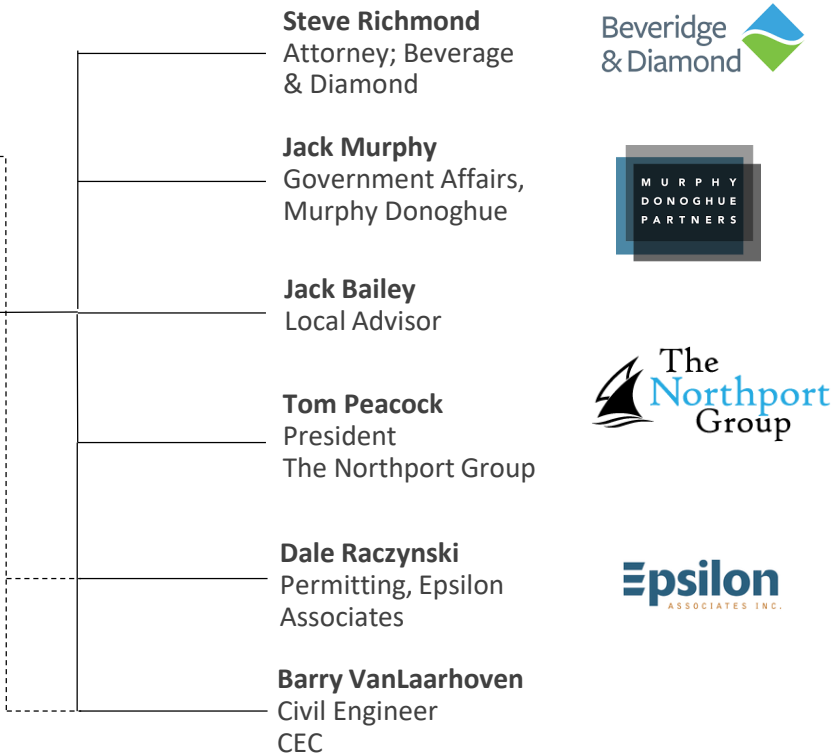
## ARIES CORE TEAM



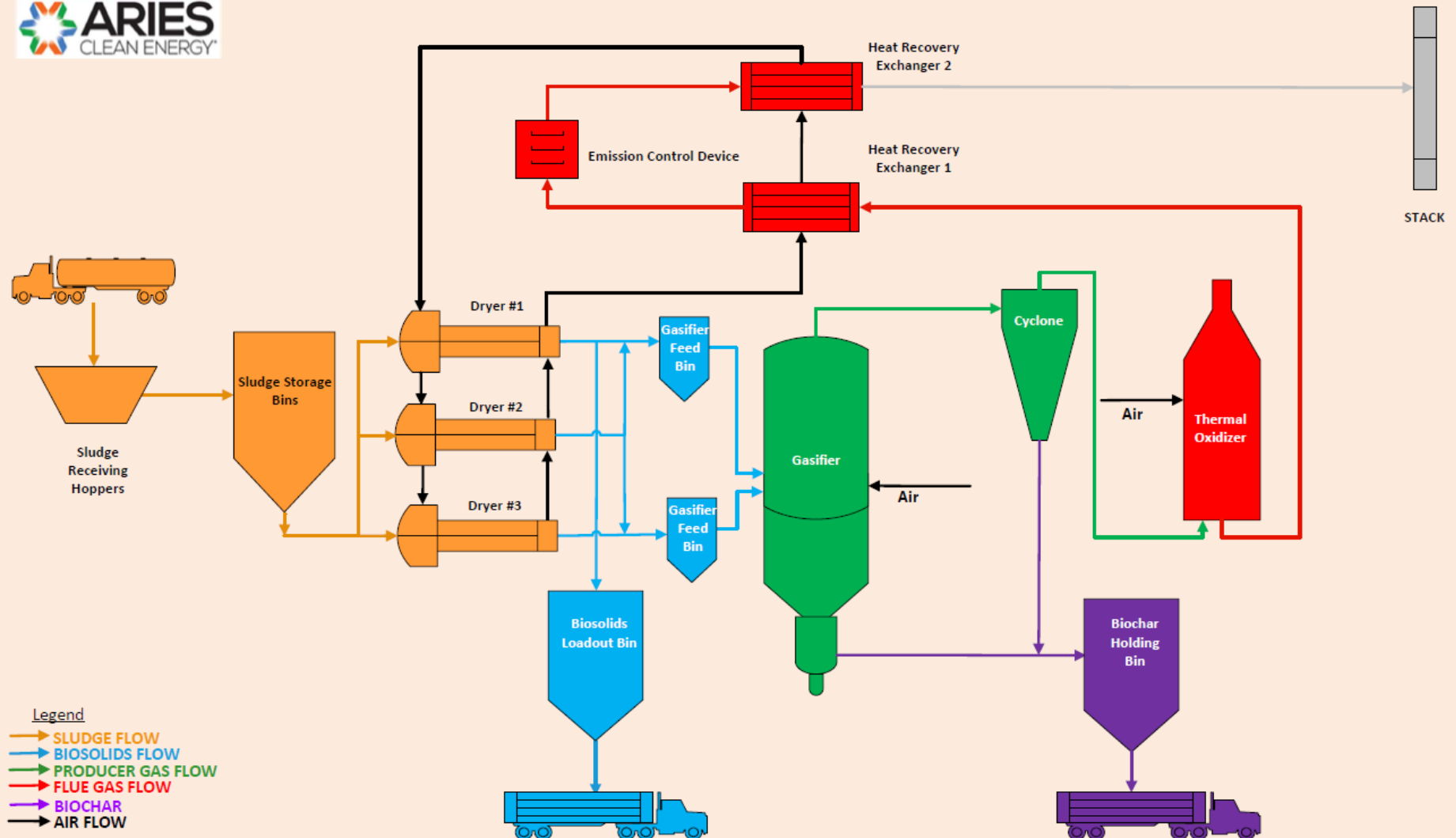
### Internal Aries Project Support

Greg Bafalis – CEO  
Mark Witt - CFO  
Renus Kelfkens – VP Engineering  
Ron Hudson - Permitting Director

## ARIES EXTERNAL TEAM

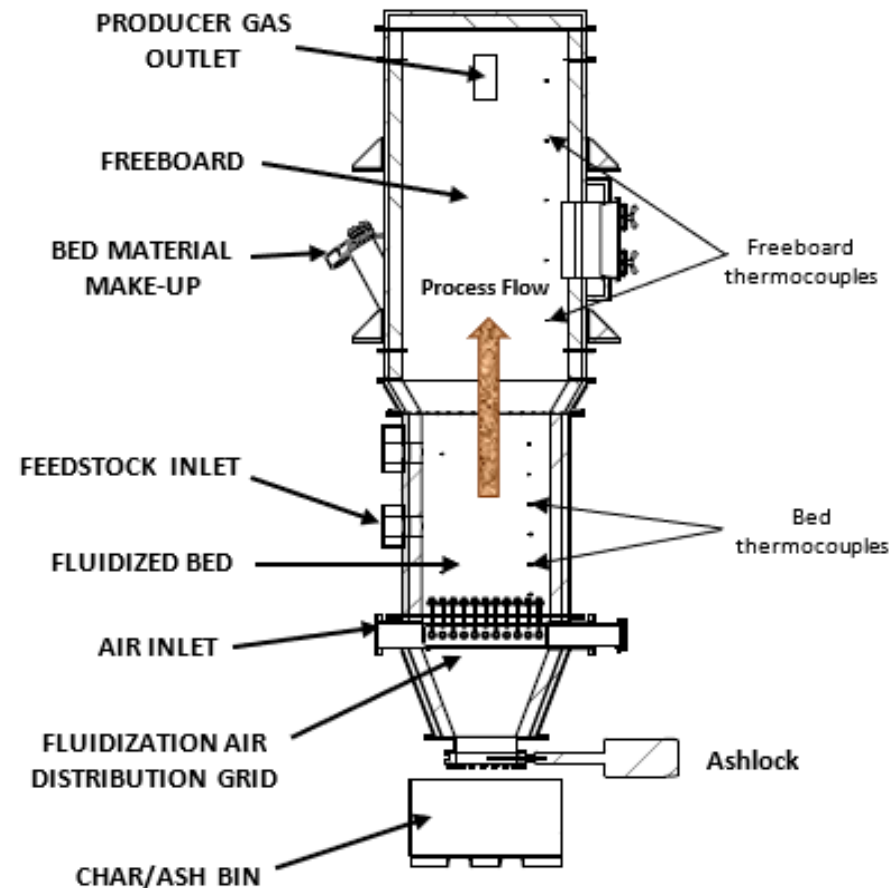


## FLUIDIZED BED GASIFICATION

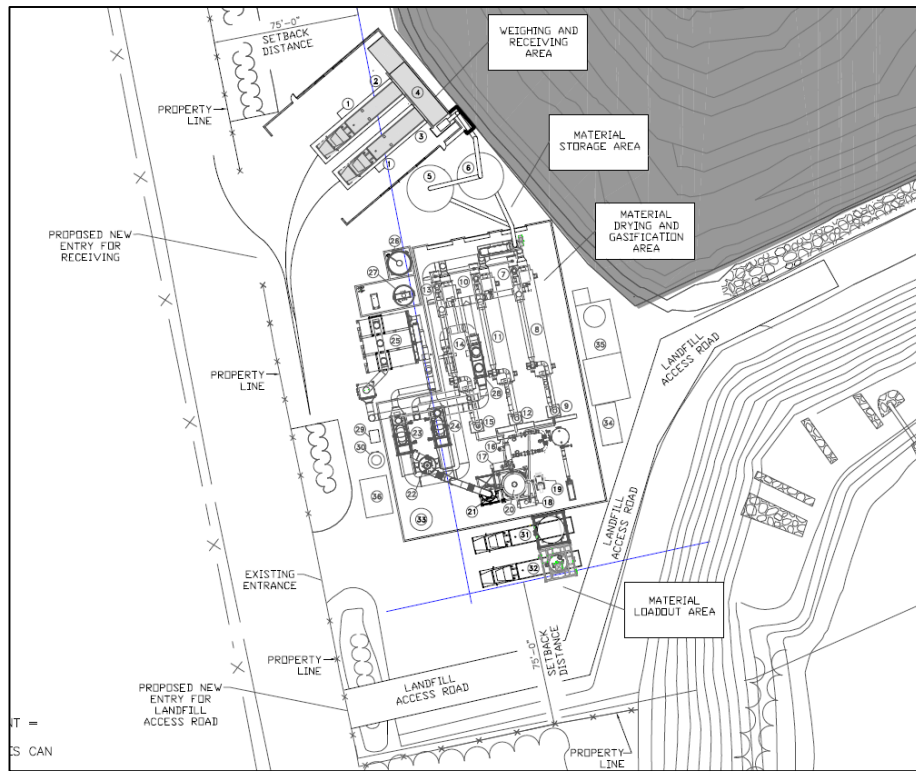


# Fluidized Bed Gasification

- Conversion of biomass into a synthesis gas (syngas) in an oxygen-starved environment
- Thermo-chemical process
  - Heat generated through chemical reactions of biosolids and air
  - Bed temperature constant at 1,250°F through control of biosolids to air ratio
  - Self sustaining chemical reactions
  - Producer gas is primarily  $H_2$ ,  $CO$ ,  $CH_4$  and  $CO_2$
  - Controlled amount of air enters the gasifier so no combustion occurs in the gasifier- no potential for fires/explosions
  - Process does not require supplemental energy other than startup.



# Aries Taunton – Project Site



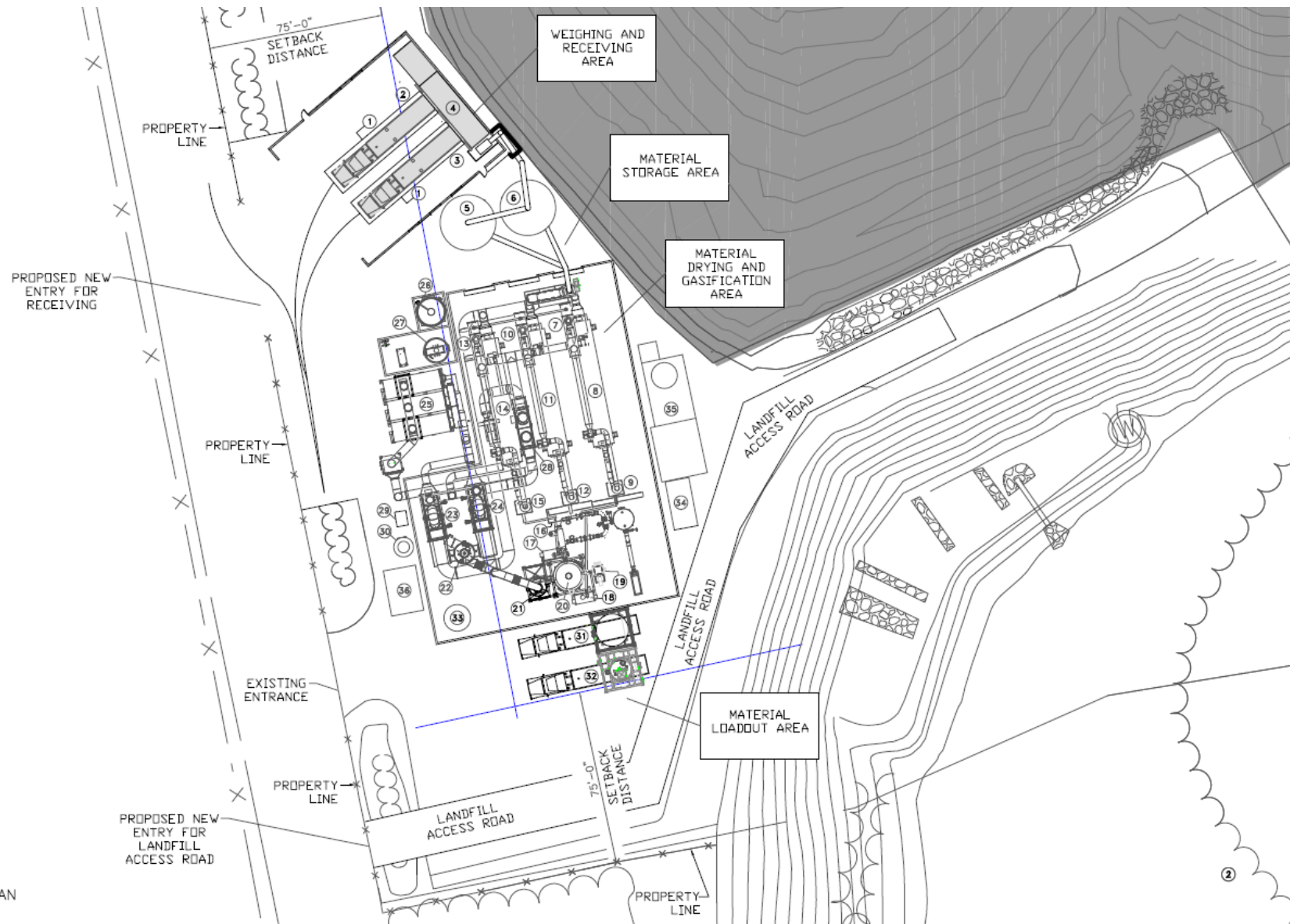
## Project Milestones

- Execute Site Option Agreement – December 2020
- Execute Biosolids Supply Agreement – January 2020
- MEPA Approval: 9-12 months/ENF Filing – December 2020
- MassDEP Regulatory Permitting: ~ 6-9 months
- Financial Close – Q2 2022
- Construction – Q2/Q3 2022
- Commercial Operations – Q2/Q3 2023

## System Description

- 470 TPD throughput
- 3 x 225 TPD biosolids dryers
- Dryers produce Type I biosolids used as gasifier feedstock
- 100 TPD Aries Patented Fluidized Bed Gasifier
- 25 TPD of biochar produced
- Heat recovery
- Air quality control equipment

# Aries Taunton – Project Site



AN

# Aries Project Benefits to Taunton

- Substantial upfront payment to City
- Annual escalating lease payment
- Annual project revenues will be shared with City
- Most favored nation biosolids disposal pricing for City
- Relocation of landfill residential recycling drop-off area at no cost to City
- Productive use of difficult-to-develop site
- Safe/sustainable long-term biosolids solution
- 35 permanent well-paying jobs
- Purchases from local businesses by Aries
- \$500,000 sewer I&I upfront payment



# Aries Project – Environmental Protection Features

- State-of-the-art odor control design
  - Totally enclosed biosolids receiving building under negative air pressure
  - Thermal oxidizer will destroy all VOC's/odor compounds
  - Biosolids delivery vehicles will be watertight and covered
  - No liquid biosolids will be accepted
- State-of-the-art air quality control system
  - Best Available Control Technology (BACT)
  - Better air quality than existing SSI's in MA
- Highly reduced truck traffic vs. landfill (20 trucks/day)
- No land disposal/no impact on existing landfill
- No water quality impacts
- State-of-the-art noise reduction



# Aries Taunton Facility Renderings



# Aries Taunton Facility Rendering



# Project Profile - Aries Linden, LLC

## System Description

- 430 TPD throughput
- 2 x 215 TPD biosolids dryers
- 100 TPD Aries Patented Fluidized Bed Gasifier
- 25 TPD of Biochar produced

## Status

- Project achieved financial close on October 30, 2019
- Currently under construction
- Received all required operating permits through NJDEP
- Financed thru Union County Improvement Authority
  - Tax Exempt Private Activity Bonds (PABs) - \$50 million
  - Bonds fully subscribed

## Counterparties

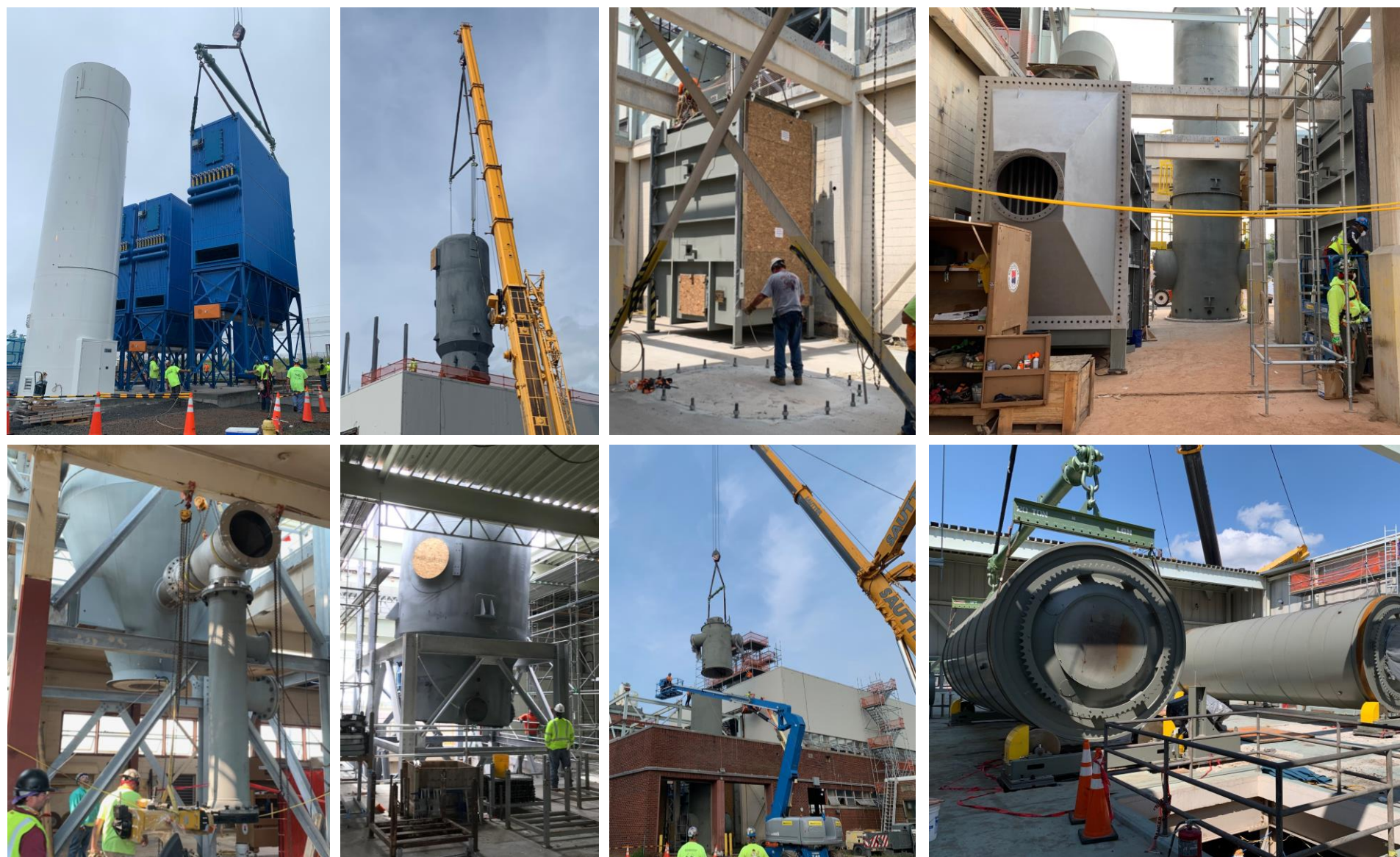
- Feedstock fully contracted
- One main biosolids supplier (300 TPD)
- 125 TPD from LRSA
- Biochar – LOI to sell to local concrete company as a fly ash substitute
- Class A Biosolids – LOI in place to sell Class A biosolids produced to a soils remediation company

## Upcoming Milestones

- Mechanical Completion – Q2 2021
- Commercial Operation – Q2/Q3 2021



# Construction Update - Aries Linden, LLC



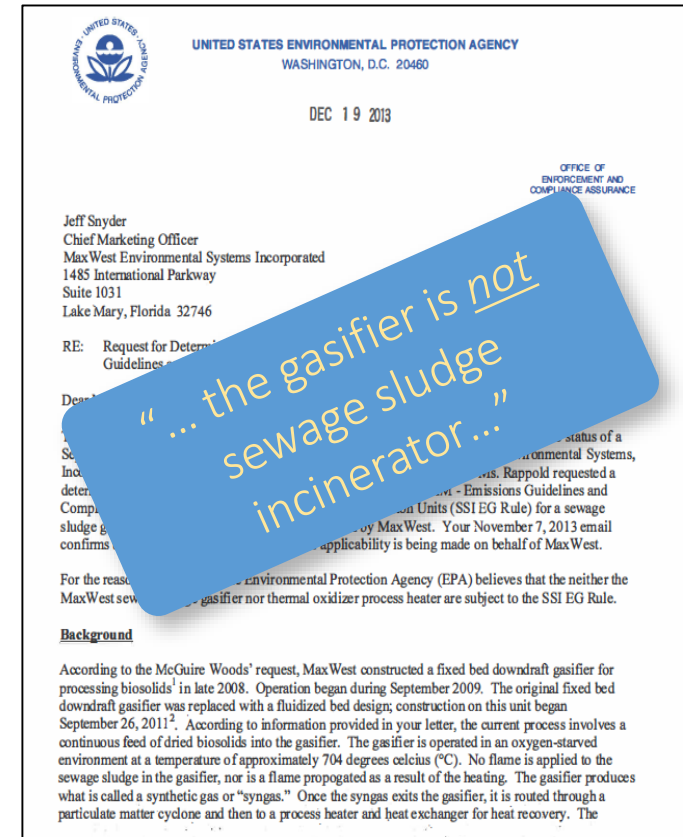
# Gasification vs Incineration

## Regulatory Treatment

- EPA ruled that the fluidized bed gasifier and thermal oxidizer combination is **NOT** classified as a sewage sludge incinerator
- Gasifiers are not regulated under the SSI rules
- Gasifier does not require supplemental energy other than startup
- NJDEP recently issued air permit for Aries Linden as a gasification facility, not incineration

**Edward Messina, Director at the Office of Compliance issued a USEPA letter that determined the following:**

*“According to the information provided by MaxWest, no flame is applied or propagated in the gasifier and the gasifier prevents combustions by limiting the air-to-sludge ratio such that combustion cannot occur. Therefore, we do not believe that the gasifier is an SSI (sewage sludge incinerator), because it does not combust sewage sludge.”*



# Aries Taunton Project – Next Steps

- Execute Site Option Agreement with City
- Begin the MEPA Process
  - File Environmental Notification Form
  - Noise study
  - Air modeling
  - Traffic study
  - Public outreach/public comments on project
  - Evaluate/mitigate any potential impacts
- Aries is committed to being a good long-term neighbor in the City of Taunton



# THANK YOU

